

## **APPENDIX A**

### **PREDICTIVE TOOL DESCRIPTION**

The predictive tool provides the West Point Safety and Environmental staff (WPSE) with enhanced capability to evaluate potential effects of a sewer discharge on Merck's compliance with its industrial user permit requirements, the currently effective federal Pretreatment Program and/or applicable Pennsylvania Clean Streams Law and Pennsylvania Solid Waste Management Act requirements. The key component of the predictive tool is a computerized database containing the composition, quantity and frequency of materials being sewered at the Facility. WPSE will employ this computer based tool when reviewing sewerage requests to facilitate the evaluation of the potential cumulative effects of sewerage different wastestreams at the Facility simultaneously or in close temporal proximity. Sewer approvals for new or additional wastestreams will be added into the database as appropriate to provide an up-to-date tool to evaluate the potential effects of discharges on environmental compliance.

The predictive tool is maintained in the form of an Excel workbook that provides both a database of materials approved for sewerage and a cumulative sitewide sum of approved materials to support the sewerage approval process. It also facilitates the routine determination of projected chemical discharges for comparison to established thresholds, including those set forth in the Facility's industrial user permit, the currently effective federal Pretreatment Program and/or applicable Pennsylvania Clean Streams Law requirements. The tool currently addresses the discharge to the Upper Gwynedd Township POTW, which constitutes over 90% of the wastewater discharge flow from the Facility. The discharge to the Upper Gwynedd Township Municipal Authority POTW from the Facility is currently covered by the existing sewer approval process and will be added into the tool as a new module. While the tool itself does not examine

potential reactions of chemicals, the tool is part of an overall process that informs and improves the sewerage approval process.

For raw materials used in pharmaceutical and vaccine production, the tool will look ahead 12 months on a monthly lot basis to predict changes in sewerage quantities based on production estimates. For routine sewerage activities such as discharges of cleaning materials, the database captures ongoing activities as a predicted daily discharge. Discharges of utilities materials are tracked through information provided by the applicable Merck department and by the vendor supplying the materials. For the Building 17 pilot plant, the database tracks discharges on an experiment by experiment basis, which is the manner in which activities are pre-planned and approved by pilot plant staff. Laboratory discharges to the sewer are approved on a one-by-one basis but tracked in the predictive tool based on categories of materials so that the sitewide impact can be evaluated. The tool will provide historical documentation of approved sewerage activities for the current one-year period which can be archived for an additional year. This function will allow enhanced opportunity to quickly retrieve information that supports new sewer approval evaluations and ensure a consistent business process.

The predictive tool is defined in the Predictive Tool Users Manual dated August 13, 2007. The Predictive Tool Users Manual was submitted to and approved by PADEP and EPA before the Entry Date of this Consent Decree. Merck shall commence use of the predictive tool no later than 60 days following the Entry Date of this Consent Decree. For purposes of this Consent Decree, Merck has committed to spend \$300,000 as was or may be necessary to perform the predictive tool remedial measure, which amount constitutes the estimated cost to design, implement and evaluate the predictive tool for the period specified in this Consent Decree.

## **APPENDIX B**

### **ENHANCED WASTEWATER MANAGEMENT PROGRAM**

Merck will enhance its ability to control wastewater discharges from the Facility by expanding its existing wastewater infrastructure. Merck will add tanks and supporting operational components to its existing infrastructure to enhance its ability to intercept unacceptable wastewater discharges at the Facility that would cause violation of the Facility's industrial user permit, currently effective federal Pretreatment Program or applicable Pennsylvania Clean Streams Law and Pennsylvania Solid Waste Management Act requirements, as described more fully below.

Additional engineering details are under development and will be shared in a work plan that will provide the following types of information: scope and description, construction schedule with major milestones, site plot plan, tank sizing, flow diagrams and operating mode.

### **AT-SOURCE SPILL CAPACITY**

Additional at-source wastewater tanks will enhance Merck's capability to control wastewater leaving the Facility and thereby comply with requirements of Merck's industrial user permit, the currently effective federal Pretreatment Program and the statutes referenced above. The tanks will be located at two critical areas of the Facility that can benefit from additional capacity to segregate wastewater flow from the other wastewater at the site should an upset condition occur. Building 17, the vaccine pilot plant, is a source of highly variable wastewater flows. Building 28/38 is an older vaccine production facility without existing building-specific equalization facilities. The at-source tanks to be installed at these locations will provide additional flexibility in managing the wastewater, including the capability to contain a spill or

upset at the source area and minimize impact to Merck's wastewater systems. Similarly, some holding capacity in these areas will allow their wastewater to be segregated from wastewater affected by any upset condition elsewhere at the Facility. The tanks would also allow more time for a safe shutdown of selected facilities if an emergency condition so required.

The scope of the project will include new tanks and supporting infrastructure at both the Building 17 and Building 28/38 areas. Each project will include a tank system to provide for collection and/or diversion capability. The following features will be included as part of each of the two systems:

- Facilities to transfer the material in the tank(s) to a tank truck for offsite disposal if required.
- Piping, instrumentation and controls to allow for effective operation of the tanks under the following operating scenarios: routine flow, diversion flow, offloading of wastewater or re-direction into the sewer.
- The tanks will be sized to serve the following functions: (1) collect and hold process wastewater as part of normal operation, as appropriate, then release to sewer, (2) collect and hold process wastewater in an upset condition for proper evaluation and discharge to sewer or off-loading to a tanker truck or container, (3) provide tank capacity to allow the building to reach stable hold point for critical operations during a wastewater event elsewhere on or off the Facility, and (4) provide tank capacity to allow the operator to store for a controlled discharge to sewer or off-loading to a tanker truck or container.

Merck expects to install at least three tanks (12,000 gallons each) to capture wastewater from the Building 17 area and at least a total of 36,000 gallons of tank(s) capacity to capture wastewater from the Building 28/38 area.

The operating plan for the Building 17 at-source wastewater tank project dated August 10, 2007 was submitted to and approved by EPA and PADEP before the Entry Date of this Consent Decree. An operating plan for the Building 28/38 tank(s) similar to the plan approved

for Building 17 shall be submitted to EPA and PADEP within six months after the Entry Date of this Consent Decree. The Work Plan referenced above shall be submitted to EPA and PADEP within six months after the Entry Date of this Consent Decree. The at-source tanks shall be constructed and placed into operation in accordance with the schedule set forth in this Consent Decree.

#### **END OF PIPE SPILL CAPACITY**

At the Building 24 wastewater area, two existing 800,000 gallon equalization tanks provide mixing and attenuation as well as spill capacity. In an effort to expand Merck's ability to capture any spills at the Facility and/or to prevent ongoing discharge of any wastewater not conforming to permit requirements, another tank or set of tanks of equal size that could be used to divert wastewater will be provided. The scope of the project includes installation of an 800,000 gallons of tank capacity and the associated piping necessary to allow the capabilities to divert wastewater into the tank or set of tanks, to offload wastewater into tank trucks or to direct wastewater to re-enter the wastewater sewer system. Instrumentation and controls will be installed to operate the tank or set of tanks effectively. The tank or set of tanks shall be constructed and placed into operation in accordance with the schedule set forth in this Consent Decree.

For purposes of this Consent Decree, Merck has committed to spend \$9,250,000 as was or may be necessary to perform the Enhanced Wastewater Management Program remedial measure, which amount is comprised of the following categories of costs: Site work, equipment, instrumentation/controls, materials, construction/installation, engineering, evaluation and contingency.

## **APPENDIX C**

### **Chemical Material Accountability System (CMAS) Description**

The Chemical Material Accountability System (CMAS) is a tool designed to help manage incident response. CMAS provides information on the identity, quantity and location of chemicals present at the Facility in a manner that allows the user to quickly prioritize investigation of an incident.

The Facility utilizes four major planning and tracking systems that contain information on the identity, quantity and location of chemicals. These systems include the Commercial Chemical Tracking System (CCTS) that tracks inventory of fine chemicals in the medicinal chemistry area (Building 14), the Electronic Information Tracking System (EITS) that manages the receipt, use and inventory of materials and equipment in the Biologics Pilot Plant and Biologics Support Area, the Enterprise Resource Planning system (ERP) that processes inventory information for production, planning, quality control and warehousing of pharmaceutical and vaccine (Building 17 package area) clinical supplies, and the Integrated Manufacturing Planning Accounting Control Tracking system (IMPACT) that helps to manage inventory information, planning, cost analysis and quality control in pharmaceutical and vaccine production. The Facility also utilizes a procurement system called E-Z Buy from which inventory information can be estimated for areas, such as laboratories, for which no electronic inventory is maintained. CMAS is not a Facility-wide inventory system; Merck supplements the sources mentioned above, where appropriate, with fixed estimates that reflect quantities at a particular location that are most useful for incident investigation (e.g. estimates assume certain tanks are filled to their capacities).

CMAS combines information extracted or derived from these various sources and provides a centralized portal to access the information. The information from the various source systems appears to the user as part of a single system, thereby providing the user with a unified picture of the identity, quantity and location of chemicals at the Facility included within the underlying systems.

CMAS has two major system functions:

- CMAS provides a web based query screen to allow users to search for specific materials and/or specific locations at the Facility from any or all of the source systems. This information can be acquired directly from the source systems for their most current data, or it can be acquired from the CMAS data warehouse for inventory information from the recent past.
- CMAS extracts inventory data (materials, locations and quantities) from the four existing data sources on a daily basis and stores that "snapshot" information in the CMAS warehouse database to form a historical archive of inventory information.

This system is primarily used by two user groups:

- Site Security, Protection and Response personnel will use CMAS in the course of conducting an emergency response. In the event of an environmental or hazardous incident, the tool may be used in a 'real-time' capacity, i.e. the most up-to-date information in the source systems may be accessed, to find the location of specific material or to identify material in a particular location. These users will be interested in quickly retrieving accurate, current chemical information to assist in making emergency decisions.
- Safety and Environmental Services personnel will use CMAS in a similar manner as the Site Protection and Response staff. In addition, it will be used by them to help investigate incidents that occurred in the recent past. These users will mostly be interested in comprehensive, aggregated data that identify data changes to assist them in re-creating material movement actions.

The CMAS User Manual dated August 13, 2007 was submitted to and approved by EPA and PADEP before the Entry Date of this Consent Decree. Merck is currently utilizing CMAS as an incident response management tool. Merck is adding transactional data to CMAS from

IMPACT, EITS and ERP sources. Transactional data are records of the movement or transfer of material at the Facility and assist in determining the location of material. Transactional data will be retrieved directly from the source systems, and not the CMAS warehouse database. The inclusion of transactional data in CMAS will be complete by March 1, 2008. Thereafter, in accordance with the schedule set forth in this Consent Decree, Merck will perform a baseline research laboratory inventory, or alternatively submit information to EPA and PADEP demonstrating that this enhancement would not materially improve the ability of CMAS to function as an investigation and response tool or that a more limited enhancement would do so. For purposes of this Consent Decree, Merck has spent or committed to spend \$450,000 as was or may be necessary to perform the CMAS remedial measure, which amount constitutes the estimated cost to design, implement and evaluate CMAS for the period specified in this Consent Decree.



## **APPENDIX D**

### **STATE COMMUNITY ENVIRONMENTAL PROJECT**

#### **Angus Tract at Erdenheim Farm Purchase and Protection**

1. Within thirty days following the Entry Date of this Consent Decree, Merck shall establish an escrow account and fund the account in the amount of \$4.5 million for the purpose of assisting the Whitemarsh Foundation in its purchase and protection of the Angus Tract through conservation easements and provisions for public access. The Angus Tract is located adjacent to and upgradient from the segment of the Creek flowing through the Natural Land Trust tract at Erdenheim Farm and has been farmed for over 100 years, most recently as pasturage for Angus cattle. The Angus Tract, an approximately 100 acre portion of Erdenheim Farm, is presently owned by the Dixon estate. Merck shall release the monies in this escrow account for the benefit of the Whitemarsh Foundation in its purchase of the Angus Tract and establishment of conservation easements on the property.

2. The funds in this escrow account, together with any accrued interest and less any fees of the escrow agent, shall be applied to the purchase price of the Angus Tract at closing if the Whitemarsh Foundation purchases the Angus Tract on or before the one year anniversary of the Entry Date of the Consent Decree. As a condition of expenditure from this escrow account, Merck shall require that any purchase of the Angus Tract include the establishment of easement(s) and/or restrictive covenant(s) in substantially the form submitted to PADEP and EPA on September 5, 2007 as revised on September 13, 2007, or as are otherwise reasonably acceptable to EPA and PADEP on the Angus Tract, providing public access; designating certain portions of the Angus Tract comprising approximately ten (10) acres for use as wetlands, wet

meadow, open water or similar uses; and protecting the entire tract from development, exclusive of farming, educational uses and the other uses specified in the easement.

3. This project is complete upon payment of the funds in the escrow account for the purchase of the Angus Tract, recording of the deed with the easement(s) referenced in paragraph 2 above and Merck's submission and PADEP's approval of a SCEP completion report pursuant to paragraph 32(b) of the Consent Decree. If the Angus Tract is not purchased as described, Merck shall release the funds in the escrow account for another project(s) that Merck shall propose subject to the approval of PADEP, which approval shall not be unreasonably withheld. If Defendant satisfactorily completes the SCEP, but does not spend the full amount of the escrow fund, Merck shall release the remaining funds in the escrow account for another project(s) that Merck shall propose subject to the approval of PADEP, which approval shall not be unreasonably withheld. Upon approval, PADEP shall provide written notice of that approval to the Defendant, EPA and the Court. Any such new projects as may be identified and approved shall be thereafter incorporated into this Decree through paragraph 71 of the Consent Decree. If PADEP fails or refuses to approve a project that Merck proposes, Merck may invoke the Dispute Resolution provisions of Section XIV of this Consent Decree.

4. If PADEP seeks stipulated penalties pursuant to paragraph 37 of the Consent Decree or otherwise for any alleged failure of Merck to implement this SCEP, or for any other reason related to this SCEP, Merck shall receive a credit against any stipulated penalties in the amount of the funds that Merck has placed in the escrow account.

## **APPENDIX E**

### **SUPPLEMENTAL ENVIRONMENTAL PROJECT**

#### **Wissahickon Creek Restoration SEP on NLT Tract at Erdenheim Farm**

1. As more fully described in Exhibit 1 to this Appendix E, which exhibit is incorporated herein, Erdenheim Farm consists of approximately 450 acres of property that serves as the last major working farm in the Wissahickon Valley. The portion of the Wissahickon Creek flowing through Erdenheim Farm is listed as impaired due to nutrients and siltation. This segment of the Creek would substantially benefit from restoration work within the Creek and on adjacent land. Water quality and quantity within the Creek would also be enhanced through preservation of groundwater infiltration and creation of wetlands in upland areas that serve as the source of surface water and groundwater flow to the Creek. Merck shall perform the following activities described herein.

2. Merck shall implement a SEP as described in paragraph 27 of the Consent Decree and in accordance with all provisions of Appendix E that includes the design and implementation of a Wissahickon Creek restoration project on property within Erdenheim Farm owned by the Natural Lands Trust ("NLT") at an estimated cost of \$1.7 million. Merck shall complete this SEP within four years of the Date of Entry. For purposes of calculating this four-year period, the period of time commencing when Merck first seeks permits or other government approvals and ending when those approvals are issued and no longer subject to appeal shall be excluded. This project shall seek to preserve and enhance ecosystem services and values in the watershed by, among other things, improving water quality and aquatic habitat on up to 3500 feet of the mainstem Wissahickon on the NLT Tract and shall include one or more of the following: (1)

installation of a vegetated riparian buffer and a canopy tree layer near the Creek; (2) restoration of eroded stream bank and portions of the streambed to improve ecological habitat; (3) stabilization or reduction of water temperature; (4) reduction of stream turbidity; and (5) restoration of indigenous riparian and aquatic habitat, as described in Exhibit 1 hereto.

3. Within thirty (30) days of the Date of Entry, Merck shall establish an escrow account and fund the account in the amount of \$1.7 million, the principal and any interest of which will be used to implement the SEP after payment of the escrow agent's fees and costs. Any costs expended for this SEP from the escrow account will be approved by Merck as related to the SEP. Upon demand for stipulated penalties for this SEP, the remainder in the escrow account shall be applied in the first instance toward satisfying such stipulated penalties.

4. Defendant shall provide adequate design and obtain necessary permits and approval for the Wissahickon Creek Restoration SEP at NLT Tract at Erdenheim Farm described in paragraph 27 of the Consent Decree and this Appendix E and associated Exhibit 1. NLT may serve as the permit holder. Within one year following the Entry Date of this Consent Decree, Defendant shall submit a final plan to EPA for review. This final plan shall include the details of design and completion of this SEP. Upon approval by EPA in accordance with Section VIII of this Decree, obtaining access to the NLT Tract, and receipt of the necessary permits and approvals, Defendant shall then proceed to implement this SEP.

5. The NLT Tract SEP project consists of the completion of the work as described above up to the extent that such work can be completed for no more than the amount specified above in paragraph 3 of this Appendix, and as may be supplemented by amounts directed to this SEP from other projects in this Decree. If Defendant satisfactorily completes the SEP, but does

not spend the full amount remaining in the escrow fund established for this SEP, and if Plaintiff United States or Defendant determines that the amount remaining reasonably could be applied toward another SEP, Defendant shall apply the remainder as follows: Angus Tract Watershed Restoration SEP; Wissahickon Restoration SEPs; Drinking Water Protection Early Warning System SEP; and last, the Automated Dissolved Oxygen Control at UGT POTW SEP.

6. If EPA seeks stipulated penalties pursuant to paragraph 36 of the Consent Decree or otherwise for any alleged failure of Merck to implement this SEP or for any other reason related to this SEP, Merck shall receive a credit and/or offset against any stipulated penalties in the amount of the costs that Merck has incurred for performing in whole or in part any of its obligations related to this SEP.

## **Appendix E, Exhibit 1**

### **Wissahickon Creek Watershed Preservation and Restoration Projects**

#### **(a) Preservation and Restoration of the Wissahickon Creek Watershed at Erdenheim Farm**

Merck will take the steps described below to help preserve and restore the Wissahickon Creek Watershed at Erdenheim Farm, including the Creek bed, the bank of the Creek and a portion of the up-gradient land which drains into it. The Creek restoration at the Natural Lands Trust (NLT) Tract SEP shall include, among other things, one or more of the following: creation of a vegetated riparian buffer and a canopy tree layer near the Creek, restoration of the eroded stream bank and portions of the streambed to improve ecological habitat, stabilization or reduction of water temperature, reduction of stream turbidity, and/or contribution to the restoration of indigenous riparian and aquatic habitat.

In addition, this project will work in conjunction with the Angus Tract purchase and protection SCEP, the Angus Tract restoration SEP and complementary activities by the Whitemarsh Foundation, NLT and others. The projects will utilize an eco-systematic approach to water resource protection in which up-gradient portions of Erdenheim Farm will be preserved as open space and enhanced to minimize stormwater runoff and sediment, nutrient and other pollutant loads flowing to the Creek. Easements will be placed on the conserved property that will ensure continued groundwater recharge that contributes to base flow in the Creek. The initial plans prepared for the Whitemarsh Foundation have incorporated areas of wet meadows and ponds in the lowest areas of the Angus Tract where water naturally drains. Restoration in these areas is planned to include wetland establishment, a pond or series of ponds, and possibly rain gardens that will enhance infiltration where soils and subsurface geology support them. Whitemarsh Foundation's consultant estimates that these features will encompass approximately 10 acres of wetlands, wet meadow, open water and/or other environmentally protective features. On-site subsurface testing to be undertaken by the Whitemarsh Foundation in the next stages of planning and design will determine the exact extent of these valuable features intended to help protect water resources and add habitat. These mitigation areas together with other areas of this farm preserved in natural cover or used for appropriate farming also will serve as a teaching resource for environment education by the Whitemarsh Foundation or others.

The section of the Wissahickon Creek flowing through Erdenheim Farm forms part of the segment of the Wissahickon Creek that is listed as impaired due to both nutrients and siltation. See Nutrient and Siltation TMDL Development for Wissahickon Creek. The restoration is intended to help meet the Wissahickon Creek's Total Maximum Daily Load (TMDL) for both sediment and nutrients by controlling runoff.

#### **(b) Erdenheim Farm**

Erdenheim Farm is the last major working farm in the Wissahickon Valley. First owned by William Penn, it eventually passed down to George D. Widener, who raised thoroughbred racehorses there alongside cattle and sheep. Mr. Widener divided the bulk of the farm into the four tracts that exist there today: the Angus Tract, the Sheep Tract, the Equestrian Tract, and a tract now referred to as the NLT Tract. There is an additional smaller tract which encompasses the mansion. Upon Mr. Widener's death, the farm passed to his nephew, Fitz Eugene Dixon, Jr. Upon Mr. Widener's death and thereafter, Mr. Dixon acquired fee ownership of the farm, with the exception of the NLT Tract in which Mr. Dixon held only a life estate plus two years. Mr. Dixon operated the farm from 1971 to his death in August, 2006. NLT will gain full possession of the NLT Tract no later than August, 2008. The Creek restoration SEP at the NLT Tract is intended to further NLT's plans to restore and stabilize the Creek banks, and preserve the natural beauty of the Tract.

In addition to its historical significance, the farm is an environmental treasure, an approximately 450-acre parcel in the midst of a 2,000-acre green corridor often referenced as the "Whitemarsh Valley" extending from Philadelphia to the northwest suburbs. Portions of the farm comprise key unprotected segments of this greenway. The entire farm is located within the Wissahickon Creek Watershed, along the Wissahickon Creek, south of the confluence of the Pine Run and Sandy Run with the Wissahickon. The Wissahickon Creek flows through the NLT Tract on the farm beginning just south of where the Creek exits Fort Washington State Park. The Angus Tract and Sheep Tract are located to the west and northwest of the NLT tract, respectively, both up-gradient. Certain drainage channels on the Angus Tract carrying nutrients and sediment flow into the Sheep Tract, then into the NLT tract and then into the Creek. Drainage from two subwatersheds on the Angus Tract cause the majority of the runoff from this land to flow directly onto the NLT Tract.

(c) Plans for the Preservation and Restoration of the Wissahickon Creek Watershed at Erdenheim Farm

NLT is a regional non-profit organization dedicated to the preservation of the rich environmental legacy of the Delaware Valley. NLT is the owner of the tract through which the Creek flows. Through the Creek Restoration SEP NLT and Merck will develop a restoration plan for the Creek and the adjacent corridor. NLT and Merck have assembled a team of experts to develop a comprehensive scope for the project from analysis and design through permitting and construction. The project will apply riparian and instream restoration strategies intended to help achieve one or more of the following: reduce stream turbidity, decrease downstream sediment loads, contribute to cooler water temperatures and restore indigenous riparian and cold water aquatic habitat along both sides of the Creek for up to 3,500 linear feet.

The reach of the Creek flowing through the NLT Tract encompasses approximately 3,500 linear feet between the Stenton Avenue bridge and the Morris Arboretum. The project may be performed in segments.

The estimated cost for consultant analysis, design, and permitting is approximately \$238,000. The costs for construction and installation of plantings along the corridor and certain work in the Creek is projected at approximately \$1,400,000. Merck's obligation for the Wissahickon Creek Restoration SEP at NLT Tract at Erdenheim Farm as set forth in paragraph 27 of the Consent Decree is capped at \$1.7 million. Proceeding with the project in segments will help ensure that the work undertaken is able to be completed with available funds. Merck's obligations under this SEP shall be fully satisfied upon completion of the work described in paragraph 27 and the recording of a conservation easement described more fully below to prevent disturbance of the work. Upon completion of the SEP, Merck shall have no continuing obligation to maintain the work performed pursuant to this SEP, which function is within the mission and competence of NLT, provided that the contract(s) to perform the work may place upon the contractor(s) some maintenance obligation.

The Whitemarsh Foundation is a 501(c)(3) public charity specifically organized to raise the funds necessary to preserve Erdenheim Farm. The Foundation has identified its goal as “to permanently protect the farm, maintain its existing view sheds, and continue its agricultural heritage.” To achieve this goal, the Foundation is garnering support from local and state government, corporations, non-profit organizations, and private individuals. The Foundation has an option to purchase the Angus Tract which expires in December 2007.

The Whitemarsh Foundation in conjunction with its consultant, LandConcepts Group, is exploring several options to conserve the Angus Tract as open space and enhance the ecosystem services that the tract provides, including converting the northwestern section of the tract into a meadow, with a wet meadow located in the southeast; using the northwestern section as a low-intensity agricultural area and converting the southeastern section into a wet meadow and pond; or using the northwestern section as cropland for Community Supported Agriculture (CSA), while converting the southeastern section to a preserved wet meadow. In all of these options, development would be prohibited and the southeastern section of the Angus Tract adjacent to the NLT Tract would be converted into a wetland, wet meadow or rain garden to facilitate infiltration to enhance base flow to the Creek or a combination of wet meadow and pond. This water feature would help slow the rate of water flow into the Creek from up-gradient adjoining tracts, collect and infiltrate storm water runoff, and allow certain organic pollutants to precipitate out.

If the Angus Tract is not preserved as open space, it is likely that the land would be purchased and developed for its “highest and best use,” single-family homes. The volume and rate of storm water runoff that flows along the drainage pathways on the Angus Tract would be increased as previously pervious surfaces are rendered impervious. The increased runoff would accelerate erosion of the Creek stream bank and damage and impair the function of the riparian buffer and vegetation that will be placed along the bank. In addition, development of the Angus Tract as single-family homes would diminish groundwater recharge, thus lowering the water table and impairing the Creek's base flow. The ongoing construction of an adult care facility, the Hill at Whitemarsh, located immediately upgradient of the Angus Tract, already creates the



potential for these effects, although the Angus Tract currently serves to mitigate their intensity. Further development at Erdenheim Farm would seriously impact the ecological health of the Wissahickon Creek.

If the Angus Tract is not purchased within one year of the Entry Date of the Consent Decree, Merck will use the funds earmarked for the Foundation to perform other projects as set forth in the Consent Decree and Appendices.

#### Legal Protection of the Tracts

Conservation easements will be placed on the NLT Tract to ensure the continuity of these environmental benefits. The Whitemarsh Foundation is expected to own the Angus Tract. Conservation easements in substantially the form submitted to EPA and PADEP on September 5, 2007 as revised on September 13, 2007 will also be placed on the Angus Tract to preserve it as open space. These easements include restrictions on development and use of the tract, as well as provisions for granting the public certain access to the tract and most likely some recreational trails. Depending on the preservation option selected, the conservation easement may allow low-intensity agricultural development and/or private or community supported agriculture. The easements will also restrict use of certain areas of the tract to wetlands, wet meadows and ponds. Through the Angus Tract restoration SEP Merck will make \$400,000 available to the Whitemarsh Foundation for the construction and maintenance of the environmentally protective features on the Angus Tract. These easements may be granted in favor of NLT, Whitemarsh Township, and/or another government entity or conservation group. Also, if any part of the Angus Tract were leased for agricultural purposes, the leases would include restrictions on the nature and scope of the activity as described in the easement which are intended to help preserve the ecosystem benefits for the watershed.

## **APPENDIX F**

### **SUPPLEMENTAL ENVIRONMENTAL PROJECT**

#### **Angus Tract Environmental Restoration Project at Erdenheim Farm**

1. Within thirty days following the Entry Date of this Consent Decree, Merck shall establish an escrow account and fund the account in the amount of \$400,000 for the purpose of enhancement and maintenance of the environmental features and public access on the Angus Tract including the creation of up to approximately ten (10) acres of wetlands, wet meadow, open water and/or other environmentally protective features of the Angus Tract. The principal in this account, together with any accrued interest and less any fees of the escrow agent and reasonable administrative costs of the Whitmarsh Foundation and NLT, shall be applied to pay restoration costs incurred by the Whitmarsh Foundation or the Natural Lands Trust as described above, in paragraph 28 of this Consent Decree, herein and in Exhibit 1 to Appendix E, on the Angus Tract as such costs may be approved by Merck upon submission of appropriate documentation by the Whitmarsh Foundation or NLT. Upon demand for stipulated penalties for this SEP, the remainder in the escrow account shall be applied in the first instance toward satisfying such stipulated penalties. Merck may appoint NLT to review and approve any expenditures of the Whitmarsh Foundation and may reasonably compensate NLT for such services from the monies in the escrow account. Merck shall make the escrowed funds available to the Whitmarsh Foundation and NLT until the fourth anniversary from the Date of Entry or until the project is complete as described above, whichever comes first. The amount that Merck must spend to implement this SEP shall be no more than the amount that Merck is required to place in escrow by this paragraph 1, together with any accrued interest and monies directed to this SEP from

other SEPs in this Decree, and less fees and expenses authorized herein. For purposes of calculating this four-year period during which expenditures may be made, the period of time commencing when the Whitemarsh Foundation or NLT first seek permits or other government approvals and ending when those approvals are issued and no longer subject to appeal shall be excluded.

2. This SEP is contingent on the Whitemarsh Foundation's satisfactory completion of the purchase and protection of the Angus Tract through conservation easements and provisions for public access as described in Paragraph 26 and Appendix D of this Decree, State Community Environmental Project ("SCEP"). If the Angus Tract is not purchased as described on or before the one-year anniversary of the Entry Date of the Consent Decree, Merck shall provide written notice to Plaintiffs and the Court within thirty days of such event. Within 180 days of the notice that the Angus Tract has not been purchased as described, Merck shall either apply the SEP monies as provided in paragraph 3 below or propose specific alternative SEPs to EPA for the approval or disapproval of EPA in accordance with the requirements of EPA's SEP Policy, which approval shall not be unreasonably withheld. Any such proposal shall include a detailed description of the proposed SEP, schedule for implementation and an estimate of costs. Upon approval in accordance with the requirements of EPA's SEP Policy, EPA shall provide written notice of that approval to the Defendant, PADEP and the Court. Any such new projects as may be identified and approved shall be thereafter incorporated into this Decree through paragraph 71. Any approved SEP shall be implemented according to the schedule as approved but in no case longer than five years from the Date of Entry. If EPA disapproves any proposal in whole or in part, Defendant shall cure the disapproval or propose another project consistent with the criteria

set forth above within ninety days of Defendant's receipt of notice of the disapproval, unless Defendant invokes the Dispute Resolution procedures in paragraph XIV of this Consent Decree.

3. This SEP is complete upon the completion of the restoration work described in this SEP or any alternative SEP undertaken in accordance with paragraph 2 above, subject to the limits of the escrow account as described in paragraph 1 above. If Defendant satisfactorily completes this SEP, but does not expend the full amount of the escrow account set up for this SEP, if the Whitemarsh Foundation delays or abandons implementation of this SEP or if this SEP is not otherwise complete within the four-year period and if Plaintiff United States or Defendant determines that the amount remaining reasonably could be applied toward another SEP, if not already completed, Defendant shall apply the remainder towards completion of the SEPs in priority order as follows: NLT Tract Restoration SEP; Drinking Water Protection Early Warning System SEP; Wissahickon Restoration SEPs; and last Automated Dissolved Oxygen ("DO") Control at UGT POTW SEP.

4. If EPA seeks stipulated penalties pursuant to paragraph 36 of the Consent Decree or otherwise for any alleged failure of Merck to implement this SEP or for any other reason related to this SEP, Merck shall receive a credit and/or offset against any stipulated penalties in the amount of the costs that Merck has incurred for performing in whole or in part any of its obligations related to this SEP.

## **APPENDIX G**

### **SUPPLEMENTAL ENVIRONMENTAL PROJECT**

#### **Drinking Water Protection Early Warning System SEP.**

1. This project is to provide an early warning system that monitors fish activity to provide advance notice to the City of Philadelphia Water Department ("PWD") of the presence of materials in Wissahickon Creek that may constitute a threat to drinking water that PWD withdraws from the Schuylkill River downstream of its confluence with the Creek. Intelligent Automation Corporation manufactures an intelligent aquatic biomonitoring system ("IABS") which may be placed at the building commonly known as the Queen Lane Screen House. That building is part of the Queen Lane Water Treatment Plant. The drinking water intake is situated on the Schuylkill River immediately downstream of the confluence with Wissahickon Creek. The Queen Lane Screen House currently houses screens for removal of floating debris to protect pumps and other equipment. In the treatment process the building is located after the intake structure and before the raw water pumps which lift the water to the treatment plant's primary sedimentation basin (Raw Water Basin).

2. Within 30 days following the Entry Date of this Consent Decree, Merck shall establish an escrow account and fund the account in the amount of \$350,000 to assist PWD in the purchase, installation and maintenance of the IABS. The funds placed in this account, together with any accrued interest and less any fees of the escrow agent and reasonable administrative costs of the PWD, shall be applied to pay for costs of the early warning system as described above, in paragraph 29, of the Decree and herein, as such costs may be approved by Merck upon submission of appropriate documentation by PWD. Upon demand for stipulated penalties for

this SEP, the remainder in the escrow account shall be applied in the first instance toward satisfying such stipulated penalties. Merck shall make the escrowed funds available to PWD until the second anniversary of the Date of Entry or until the early warning system is purchased, installed and operated for one year, whichever comes first. The amount that Merck must spend to implement this SEP shall be no more than the amount that Merck is required to place in escrow pursuant to this paragraph 2, together with any accrued interest and monies directed to this SEP from other SEPs in this Decree, and less fees and expenses authorized herein. For the purpose of calculating the two-year period during which expenditures may be made, the period of time commencing when PWD first seeks permits or other government approvals and ending when those approvals are issued and no longer subject to appeal shall be excluded.

3. This SEP is complete upon the completion of the early warning system purchase, installation and one year of operation and maintenance, subject to the limits of the escrow account described in paragraph 2 above. If Defendant satisfactorily completes this SEP, but does not expend the full amount of the escrow account set up for this SEP, or if PWD delays or abandons implementation of this SEP or the SEP is otherwise not complete within the two-year period and if Plaintiff United States or Defendant determines that the amount remaining reasonably could be applied toward another SEP, if not already completed, Defendant shall apply the remainder towards completion of the SEPs in priority order as follows: NLT Tract Restoration SEP; Angus Tract Restoration SEP; Wissahickon Restoration SEPs; and/or Automated Dissolved Oxygen ("DO") Control at UGT POTW SEP.

4. If EPA seeks stipulated penalties pursuant to paragraph 36 of the Consent Decree or otherwise for any alleged failure of Merck to implement this SEP or for any other reason

related to this SEP, Merck shall receive a credit and/or offset against any stipulated penalties in the amount of the costs that Merck has incurred for performing in whole or in part any of its obligations related to this SEP.

## **APPENDIX H**

### **SUPPLEMENTAL ENVIRONMENTAL PROJECT**

#### **Automated Dissolved Oxygen ("DO") Control at UGT POTW.**

1. This project is to provide an Automated Dissolved Oxygen ("DO") Control at UGT POTW that discharges to the headwaters of the Wissahickon Creek intended to enhance the efficiency of the POTW's treatment system and reduce energy usage. UGT POTW currently utilizes a manual DO control system in its existing biological treatment processes (aeration tanks). Providing automatic control would help assure consistent availability of oxygen in the aeration system in response to variable demand, thereby providing optimized treatment performance, reduction of carbonaceous oxygen demand, nitrification, and reduced electricity usage.

2. Within 30 days following the Entry Date of this Consent Decree, Merck shall establish an escrow account and fund the account in the amount of \$850,000 to assist UGT in the purchase and installation of the automated DO control more fully described in Exhibit 1 hereto. The funds placed in this account, together with any accrued interest and less any fees of the escrow agent and reasonable administrative costs of the UGT, shall be applied to pay for costs of the Automated DO Control as described in paragraph 30 of the Decree, in Exhibit 1 hereto and herein as such costs may be approved by Merck upon submission of appropriate documentation by UGT. Upon demand for stipulated penalties for this SEP, the remainder in the escrow account shall be applied in the first instance toward satisfying such stipulated penalties. Merck shall make the escrowed funds available to UGT until the third anniversary of the Date of Entry or until this SEP is completed as described above whichever comes first. The amount that Merck



must spend to implement this SEP shall be no more than the amount that Merck is required to place in escrow pursuant to this paragraph 2, together with any accrued interest and monies directed to this SEP from other SEPs in this Decree, and less fees and expenses authorized herein. For the purposes of calculating the three-year period during which expenditures may be made, the period of time commencing when UGT first seeks permits or other government approvals and ending when those approvals are issued and no longer subject to appeal shall be excluded.

3. This SEP is complete upon the installation of the Automated DO Control, subject to the limits of the escrow account described in paragraph 2 above. If Defendant satisfactorily completes this SEP, but does not expend the full amount of the escrow account set up for this SEP, or if UGT delays or abandons implementation of this SEP or if this SEP is not complete within the three-year period, and if Plaintiff United States or Defendant determines that the amount remaining reasonably could be applied toward another SEP, if not already completed, Defendant shall apply the remainder towards completion of the SEPs in priority order as follows: NLT Wissahickon Creek Restoration SEP; and/or Angus Tract Restoration SEP.

4. If EPA seeks stipulated penalties pursuant to paragraph 36 of the Consent Decree or otherwise for any alleged failure of Merck to implement this SEP or for any other reason related to this SEP, Merck shall receive a credit and/or offset against any stipulated penalties in the amount of the costs that Merck has incurred for performing in whole or in part any of its obligations relating to this SEP.

## **Appendix H, Exhibit 1**

### **Merck & Co., Inc. West Point, Pennsylvania**

#### **Enhancement: Automated Dissolved Oxygen (DO) Control at UGT POTW**

**Objective:** Upgrade existing manual dissolved oxygen (DO) control in existing biological treatment process (aeration tanks) with automatic control to enhance efficiency of the treatment system.

**Benefits:** Continuous dissolved oxygen monitoring provides valuable information to the wastewater treatment plant operator regarding load variability and the required operational response. Automating control of dissolved oxygen assures that target DO levels are maintained in the aeration tanks at all times to ensure maximum reduction of carbonaceous oxygen demand and ammonia removal (nitrification). This project also would support and be consistent with future projects or requirements to enhance system performance especially with regard to nutrient removals. The system also offers the significant benefit of providing an amount of oxygen that is equal to the demand so that energy is not wasted compressing more air than is needed for efficient system operation. In addition, the installation of variable speed drives on the aeration blowers will facilitate efficient use of blower capacity and will avoid the significant waste of energy and the disproportionate energy costs that result from application of energy surcharges for peak demands.

**Description:** Install DO probes in existing aeration tanks nos. 3,4,5,6. Replace up to three motors to optimize aeration capacity per blower. Provide ability to adjust air flow rates on each of up to three aeration blowers and install air-actuated valves on air lines leading to each aeration tank. Provide output from DO probes to a PLC unit to control air delivery based on demand by modulating blower speed and air valves. Add new surge control panels or incorporate surge control into the new PLC. Provide interface between the new PLC and the plant master PLC or SCADA system.

**Scope:** Up to (3) Inverter-duty 250 HP motors suitable for motor speed control service

Up to (3) Wall mounted 250HP variable frequency drives

(1) PLC based DO control panel tied to plant master PLC or SCADA system

Up to (3) Surge relief panels and related instrumentation (if not incorporated into the new PLC)

Up to (4) Air-operated modulating butterfly valves

Up to (4) LDO dissolved oxygen probes and transmitters

**Cost:** For purposes of this Consent Decree, Merck has committed to spend \$850,000 as was or may be necessary to perform this project, which amount constitutes the estimated cost of design and implementation of the automated DO control at the UGT POTW.

**Estimated Annual Operating & Maintenance (O&M) Cost:** No significant O&M costs are anticipated for this enhancement and Merck has not committed to pay any O & M costs. Electrical operating costs may potentially be reduced.

**Estimated Schedule for Implementation:** Merck's obligation under this Consent Decree for this project consists of the establishment of an escrow account funded in the amount of \$850,000 and the approval of the disbursement of the funds from the escrow account when documentation is presented to Merck showing that the work to be paid from the escrow account was performed for this project. Plaintiffs and Defendant anticipate that the UGT POTW will perform the design, procurement and construction of this project over a period of 3 years plus additional time to secure the required permits and other regulatory approvals.

## **APPENDIX I**

### **SUPPLEMENTAL ENVIRONMENTAL PROJECT**

#### **Wissahickon Creek Restoration SEPs**

1. This project is to identify and fund the design and implementation of one or more Wissahickon Creek watershed restoration projects and/or Wissahickon watershed drinking water protection projects at a cost of \$1.2 million. The watershed restoration project(s) must be located in the watershed of the Wissahickon Creek or its tributaries and must include one or more of the following: installation of a vegetated riparian buffer and a canopy tree layer near the Creek; restoration of eroded stream bank and portions of the streambed to improve ecological habitat; stabilization or reduction of water temperature; reduction of stream turbidity; improvement of water quality; protection and enhancement of water resources; restoration or creation of adjacent wetlands; and/or restoration of indigenous riparian and aquatic habitat. The drinking water protection project(s) must be located in the Wissahickon Creek source water protection area and may include one or more of the following: pathogen reduction; and/or improvement to early warning systems.

2. Within thirty (30) days of the Date of Entry, Merck shall establish an escrow account and fund the account in the amount of \$1.2 million, the principal and any interest of which will be applied to pay for the costs of the projects to be approved by EPA in accordance with paragraph 3 below after payment of the fees and expenses of the escrow agent. Merck shall release the escrowed funds to or on behalf of the person or entity performing the restoration or protection project upon submission of appropriate documentation showing that the costs incurred related to the project. Upon demand for stipulated penalties for this SEP, the remainder in the

escrow account shall be applied in the first instance toward satisfying such stipulated penalties. Merck shall secure agreement from the person or entity performing the project to complete the project within four (4) years of the Date of Entry. The amount that Merck must spend to implement this SEP shall be no more than the amount set forth in this paragraph.

3. Within one year of the Date of Entry, Merck shall propose specific SEPs to EPA for the approval or disapproval of EPA in accordance with the requirements of EPA's SEP Policy. Any such proposal shall also meet the criteria set forth above in paragraph 1 of this Appendix including a detailed description of the proposed SEP, schedule for implementation and an estimate of costs. Upon approval, EPA shall provide written notice of that approval to the Defendant, PADEP and the Court. Any such new projects as may be identified and approved shall be thereafter incorporated into this Decree through paragraph 71. Merck shall make the escrowed funds available according to the schedule as approved but in no case longer than four years from the Date of Entry. If EPA disapproves any proposal in whole or in part, Defendant shall cure the disapproval or propose another project consistent with the criteria set forth above within ninety days of its receipt of notice of disapproval subject to Merck's right to invoke the Dispute Resolution provisions of Section XIV of this Consent Decree. If before the second anniversary of the Date of Entry EPA does not approve sufficient projects to exhaust the escrow fund, Merck may after notice to EPA and PADEP elect to apply some or all of the remaining funds in the escrow account to another SEP approved in this Consent Decree.

4. Defendant shall demonstrate in its SEP proposal that the escrow account contains sufficient funds to adequately design and obtain necessary permits and approval for the project.

5. EPA's approval of the Wissahickon Creek Restoration SEP(s) requires Defendant

to fund the SEPs from the escrow account up to the extent that all approved projects can be completed for no more than the amount specified in paragraph 2 above, and as may be supplemented by amounts directed to this SEP from other projects in this Decree. If Defendant satisfactorily completes the SEP, but does not spend the full amount remaining in the escrow fund set up for this SEP, and if Plaintiff United States or Defendant determines that the amount remaining reasonably could be applied toward another SEP, Defendant shall apply the remainder as follows: NLT Tract Watershed restoration SEP; Drinking Water Protection Early Warning System SEP; and last, the Automated Dissolved Oxygen Control at UGT POTW SEP.

6. This SEP is complete upon the completion of all projects approved by EPA pursuant to paragraph 31 of the Consent Decree, subject to the limits of the escrow account described in paragraph 2 above.

7. If EPA seeks stipulated penalties pursuant to paragraph 36 of the Consent Decree or otherwise for any alleged failure of Merck to implement the SEP or for any other reason related to this SEP, Merck shall receive a credit and/or offset against any stipulated penalties in the amount of the costs that Merck has incurred for performing in whole or in part any of its obligations related to this SEP.